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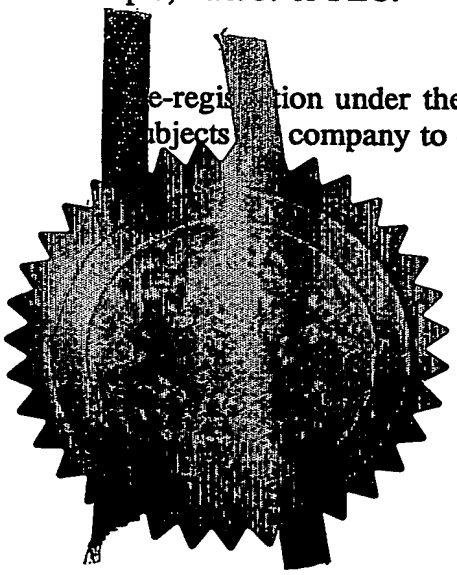

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2. Patent application number *(The Patent Office will fill in this part)* — 06 NOV 2002 — 0225906.7

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

Ian Geoffrey WORTON and
26 Shire Ridge
Walsall Wood
Walsall
WS9 9RB
England

Peter Karl NEATH
98 Birmingham Road
Aldridge
Walsall
WS9 0AQ
England

Patents ADP number *(if you know it)*

05976055002 — 08500910001

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

HEATING RACKS

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

LAURENCE SHAW & ASSOCIATES
5th Floor, Metropolitan House
1 Hagley Road, Edgbaston
Birmingham B16 8TG

Patents ADP number *(if you know it)* — 13623001

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Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

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Continuation sheets of this form	
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Claim(s)	3
Abstract	1
Drawing(s)	7 + 7

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Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature Laurence Shaw & Associates Date 6/11/02
LAURENCE SHAW & ASSOCIATES

12. Name and daytime telephone number of person to contact in the United Kingdom — Keith Leaman 0121 454 4962

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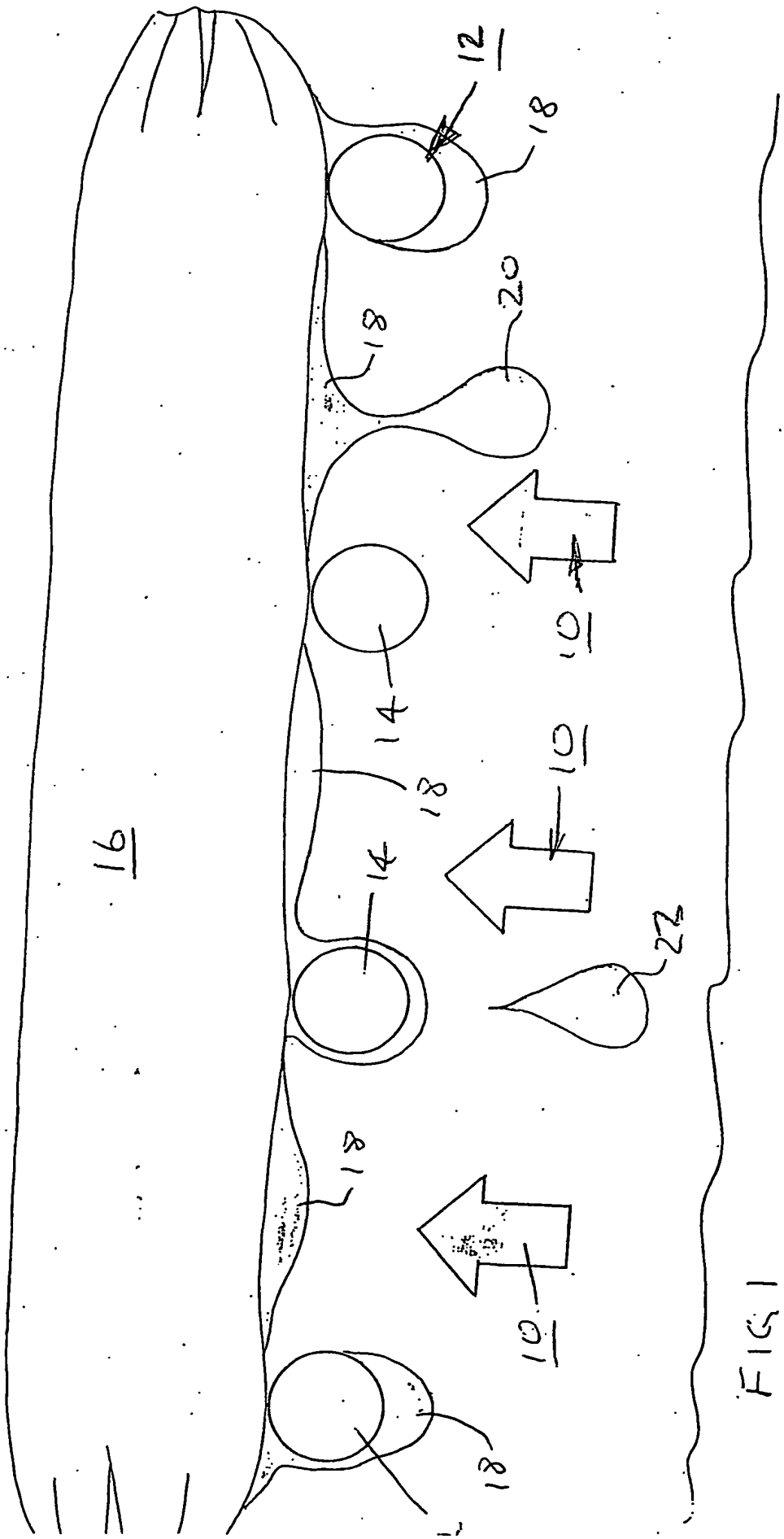


FIG 1

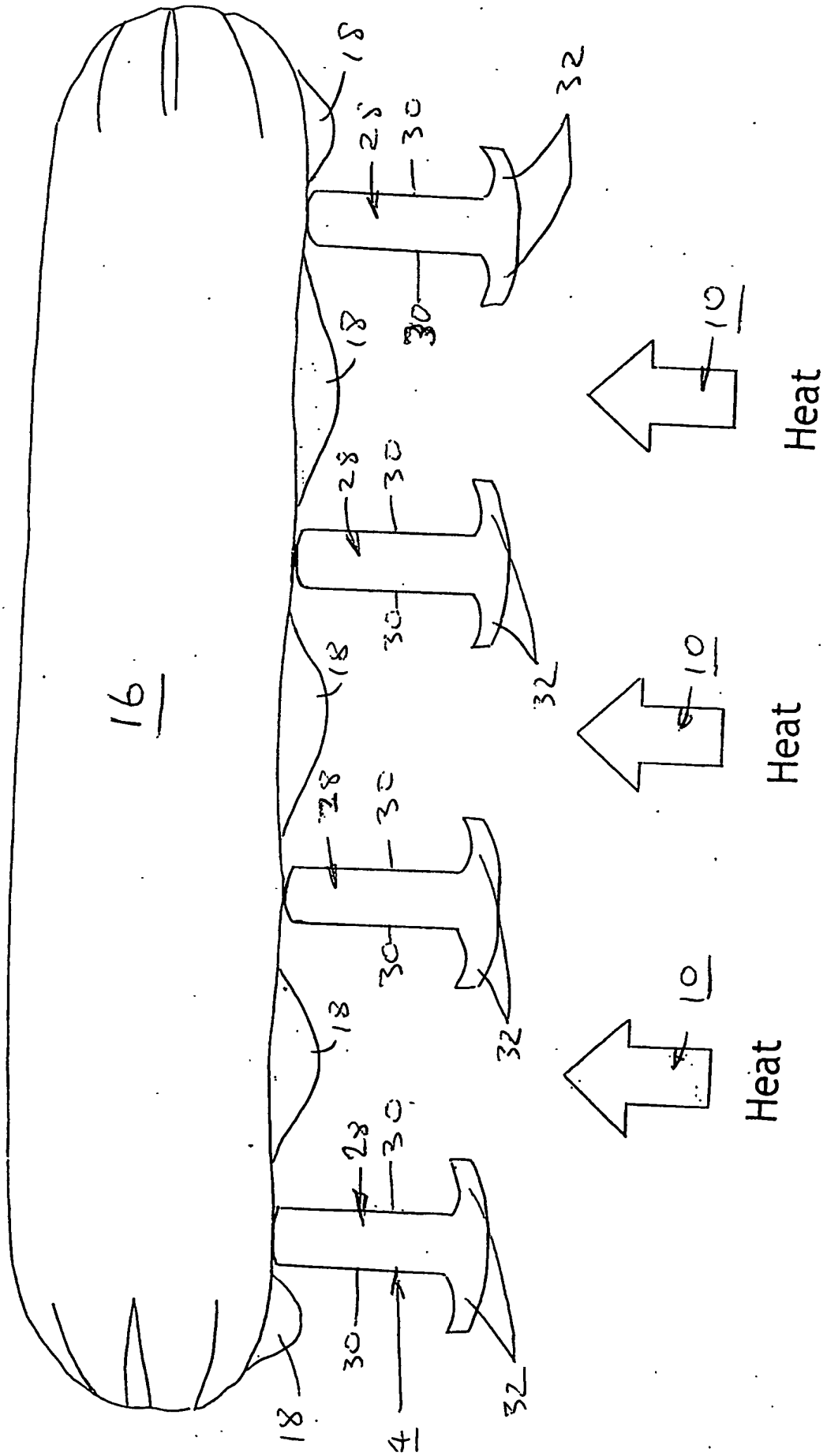
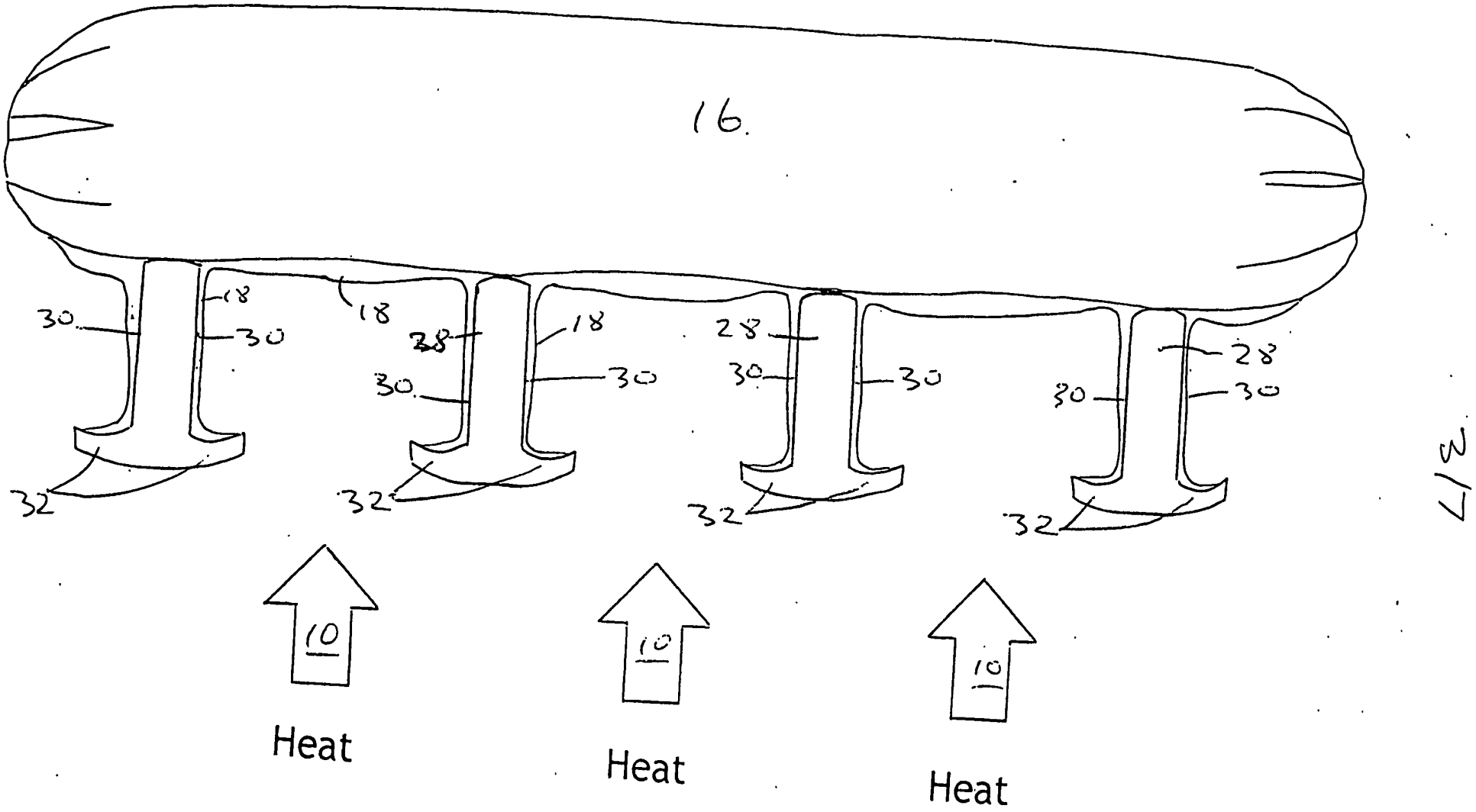


Fig 2

Fig 3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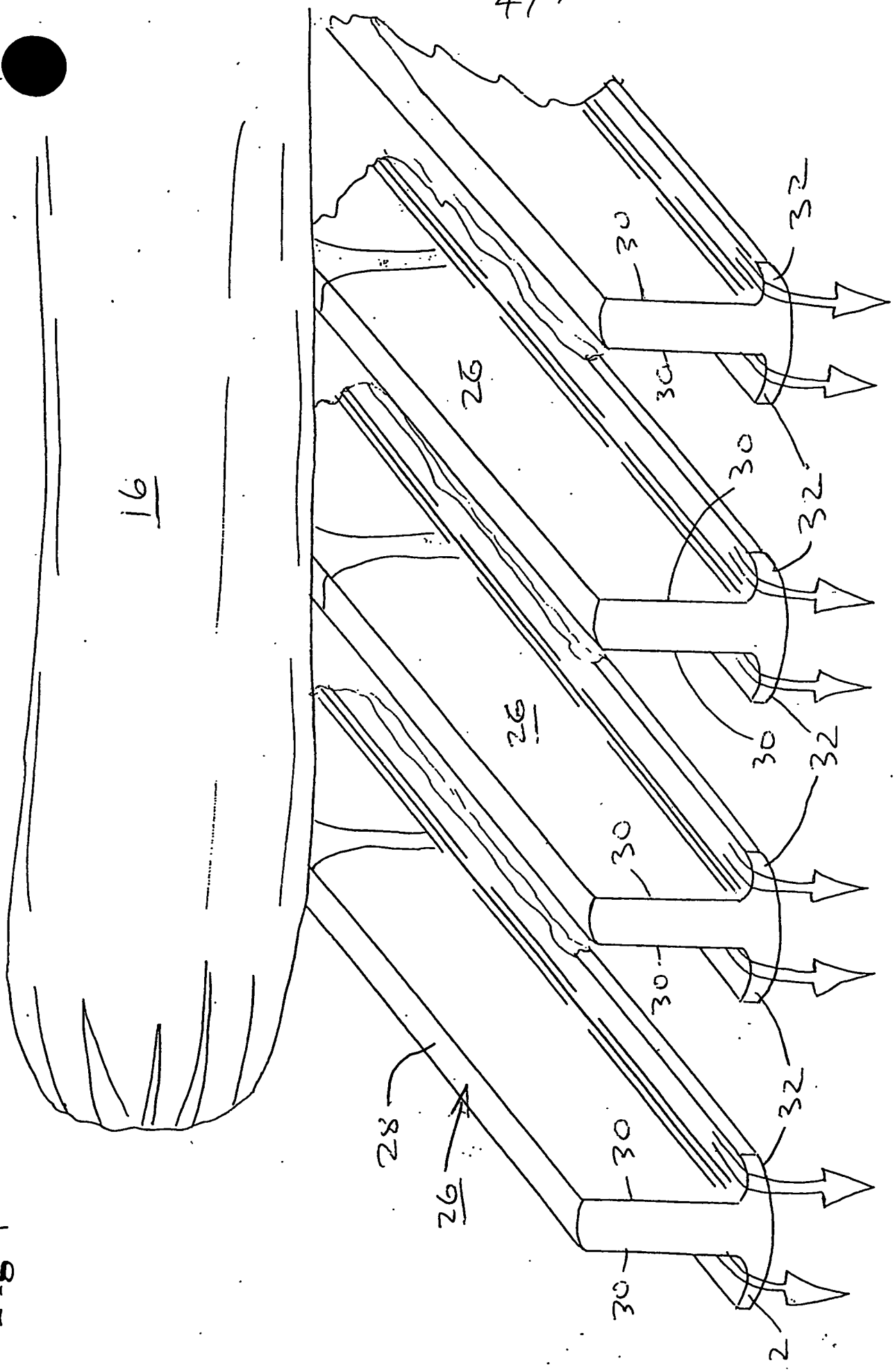


Fig 4

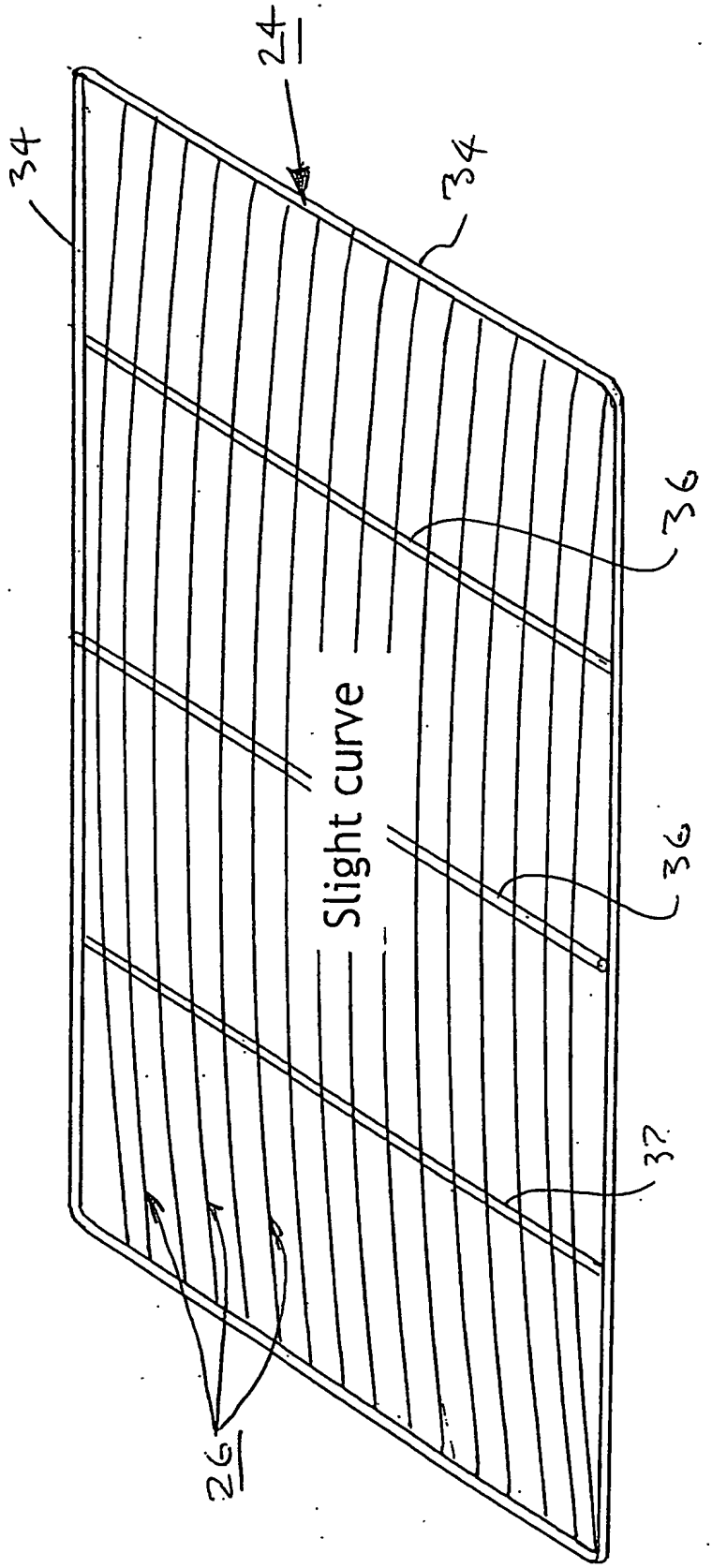
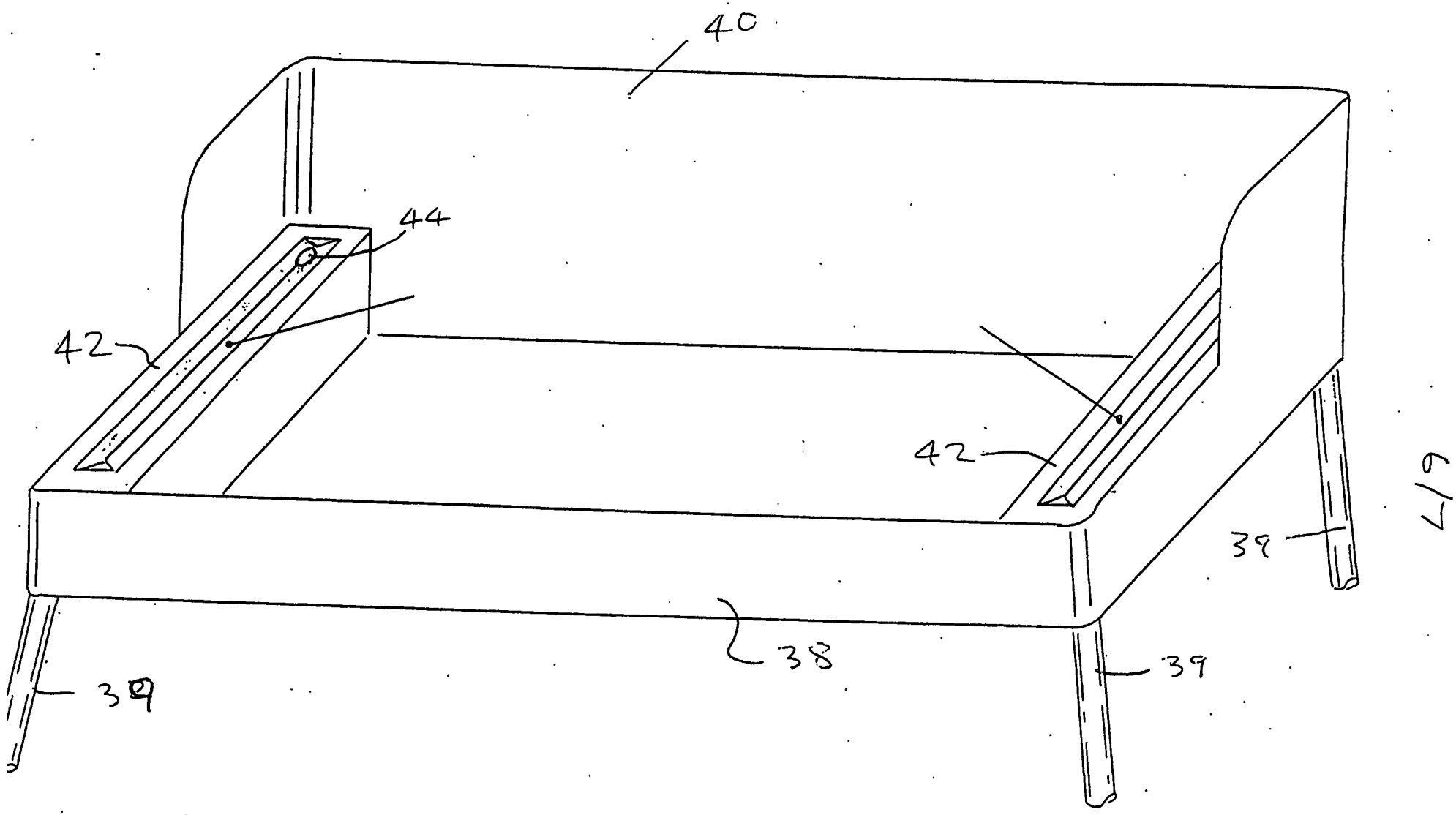


Fig 5

Fig 6

Collecting fluid



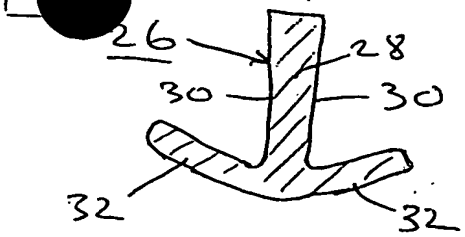


FIG 7

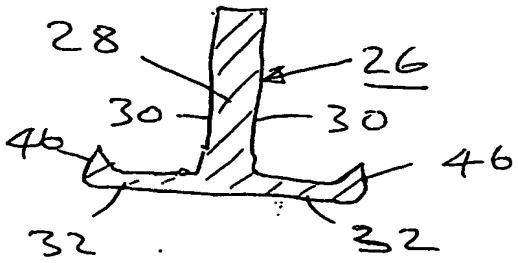


FIG 8

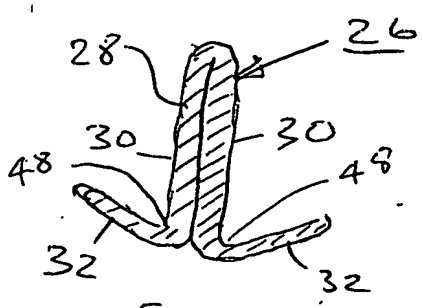


FIG 9

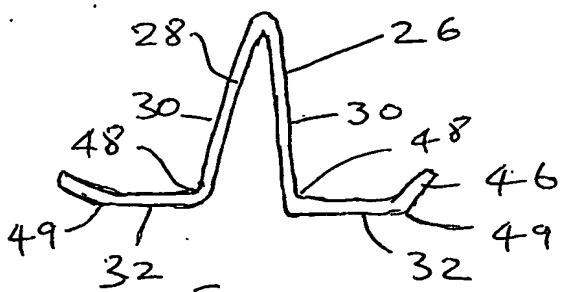


FIG .10

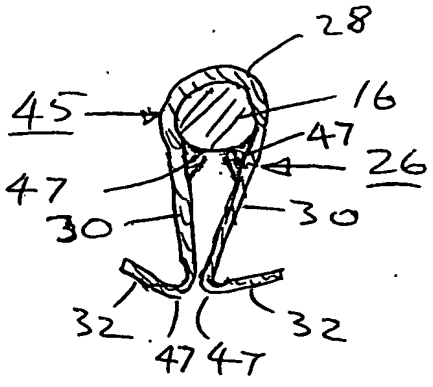


FIG 11

Agents ref: P03759GB

HEATING RACKS

This invention relates to heating racks and in particular, although not exclusively to heating racks for heating and cooking food. The invention has particular relevance to the cooking of fatty foods over naked flames such as barbecues.

It is to be understood that the present invention may be applied in cooking ovens or in grills and industrial ovens. Where the context permits, the present invention may be used in the heating of other objects where heating the object results in the melting of the object.

One of the main problems with cooking fatty foods such as sausages, meat, kebabs, beef burgers and the like over charcoal or gas heated synthetic charcoal or coals, is that the fat runs down and drips into the heated coals and ignites. This causes flames to rise and overcook or burn the food being cooked.

Often the resulting flare-up causes personal danger to the user and many a user of barbecues have barbecued more than they bargained for!

There have been a number of attempts, some very complex solutions, to prevent the fat from igniting. Most, if not all, have failed.

An object of the present invention is to provide a heating rack suitable for use in barbecues, on open fires, in cooking ovens or in heating furnaces that reduces the risk of molten liquids dropping on to hot surfaces or heating surfaces.

A particular object with regards to cooking of foods over hot charcoal, coals, synthetic coals and ceramics, or naked flames is to reduce the risk of juices and melted fats from dropping on to the heat source and thereby causing flare ups or increased smoke whilst at the same time exposing more of the food to direct radiated or convected heat from the heat source.

According to one aspect of the present invention, there is provided a heating rack comprising a plurality of spaced discrete elongate members which an object to be heated is placed and exposed to a source of heat, each member having a main body with two side faces that, in use, extend in a vertical direction and along the member, and a side member located at the lowermost extremity of each side face, each side member being shaped, positioned, and arranged, relative to its respective side face so that, in use, liquid from the object when it is heated is induced to run down each side face due to surface tension effects and are collected by each side member and directed in a direction along each side member to a collection region at one or both ends of the members.

Preferably, the side members are inclined along their length so that liquid collected by the side members is directed along the side members to a collection region at one or both ends of the side members. Alternatively, the members may be inclined along their length so that the liquid collected by the side members is directed in a direction along the side members to a collection region at one or both ends of the main members. The members or just the side members could be inclined in two directions along their length.

Preferably the members are curved along their length being higher at a mid span region than at their ends.

The present invention will now be described, by way of an example, with reference to the accompanying drawings, in which:

Figure 1 shows schematically a cross-sectional view of a prior known barbecue using a known design of heating rack.

Figures 2 and 3 show schematically a cross-sectional view of a heating rack members constructed in accordance with the present invention, and show the stages of cooking a sausage.

Figure 4 shows schematically a perspective view of the rack members of Figures 2 and 3.

Figure 5 shows a rack incorporating the rack members of Figures 2 and 3.

Figure 6 shows schematically a perspective view of a barbecue tray for use with the rack shown in Figure 4.

Figures 7 to 11 show alternative cross-sectional shapes of rack members constructed in accordance with the present invention.

Referring to Figure 1 a known barbecue comprises a source of heat 10 which may be a naked flame, hot glowing charcoal, coke or coal, or synthetic heated "coals" made of ceramics, cement, or porous volcanic rocks heated by gas flames. A rack 12 is positioned above the heat source 10 on which food to be cooked is placed. The rack 12 comprises a plurality of rack members in the form of spaced elongate bars 14 of circular cross-sectional shape. Conventionally the bars 14 are welded to supporting rods (not shown) that extend transverse to the lengths of the bars 14.

Figure 1 shows a sausage 16 that is heated by the heat source 10 to a temperature at which the fat 18 starts to melt and run along the underside of the sausage. If the bars 14 are spaced too wide apart, the fat 18 builds up to a droplet 20 that falls onto the heat source 10 and ignites. Some of the melted fat 18 runs along the underside of the sausage until it touches the bars 14. The melted fat then builds up around the bars and drips off the underside of the bars as a droplet 22. Here again, the fat 18 ignites or produces smoke. The increased flames due to the burning fat 18 burns, or overcooks, the sausage 16 and produces further flow of fat and juices that fall onto the heat source 10. Before long, the cooking of the sausage 16 and other food on the rack 12 gets out of control.

Referring now to Figures 2 to 3 there is shown schematically a rack 24 constructed in accordance with the present invention which performs the same function as the rack 12 of Figure 1 and show the stages of cooking a similar sausage 16 to that shown in Figure 1. However, the rack 24 comprises a plurality of spaced elongate rack members 26 in the form of metal bars that are constructed in accordance with the present invention.

Each bar 26 is of a generally inverted "T" shaped cross-section. That is to say that each bar 26 comprises a central main body 28 in the form of a flange, having faces 30 that extend along the length of the bar 26 and project in a downwards direction, and side members in the form flanges 32 adjacent to each side face 30 of the main body 28. It is not absolutely necessary for the central flange 28 to be vertical, it could be inclined slightly away from a vertical axis providing that the flange 28 and faces 30 extend in a vertical direction and that the side flanges 32 are wide enough to collect any fat 18 that is likely to flow down the side faces 30 of the flange 28 or drip off the top

of the flange 28. This will be further appreciated when one considers the stages of heating a sausage 16 as shown in Figures 2 to 5.

In Figure 2, the melted fat 18 flows to the bottom of the sausage 16 and starts to run along the underside of the sausage 16. Providing the bars 26 are not too far apart (and this can be worked out by experiment) the melted fat will flow along the underside of the sausage until it touches the bars 26. We have found that bars 26 spaced between 5 mm to 12.0 mm apart work extremely well but it may be possible to space them wider than this.

As soon as the melted fat 18 touches the vertically extending faces 30 of the bars 26 it is induced to run down the faces 30 by surface tension effects and wet the surfaces 30, and collects on the upper surfaces of the side flanges 28. This is shown in Figure 3.

Providing at least the upper surfaces of the side flanges 32 or the whole of the side flanges 32 are inclined along their length, the melted fat collected by the flanges 32 can be directed along the flanges 32 towards one or both end of the bar 26 to a collection region (shown in Figure 6). The inclination of the flanges 32 can be achieved by inclining each of the bars 26 slightly along their length by mounting them on support rods (not shown in Figures 2 to 4 but shown in Figure 5) that extend transverse to the length of the bars 26. Alternatively the bars 26 may be made slightly curved as shown in Figure 5 (being higher at mid span region than at their ends).

In Figure 4 the bars 26 are tilted or inclined along their length, and hence the flanges 32, are slightly lower at the ends shown on the left of the drawing. Therefore melted fat 18 that runs down the faces 30 by surface tension effects and collects on the upper surface of the side flanges 28, runs along the length of each bar 26 and is poured into

a receptacle located beyond the heat source. This receptacle is not shown in Figures 2, 3 and 4 but reference is made here to Figure 6 where such a receptacle is shown.

In Figure 5 there is shown a rack 24 where the bars 26 are slightly curved, being higher at a mid-span region than at their ends. The bars 26 are mounted on a frame 34 that has three support rods 36 extending transverse to the length of the bars 26. There may be more or less support rods 36. The bars 26 are only welded to the frame 34 at each end and rest on top of the rods 36. Clearly the amount of curvature of the bars 26 should not be so great as to cause food (sausages in particular) rolling off the rack 24 to one side. We have found that a rack 24 which has the bars 26 about 1 to 2 mm higher in the centre of the length of each bar 26 than the ends works quite well.

Referring to Figure 6 there is shown a barbecue tray 38 having four legs 39 and a lid or heat shield 40. Coals, charcoal or gas heated ceramic or synthetic "coals" are placed in the tray 38 and ignited or heated. Although a rectangular tray is shown the tray could be of any shape, such as a circular shape and could have say three legs such as, for example, similar to the common kettle-type barbecues.

The tray 38 of Figure 6 incorporates two ledges 42 on to which the rack 24 of Figure 6 is rested. Each ledge 42 has a recess 43 which is in the shape of a "V" shaped trench. The rack 24 is positioned so that the ends of the bars 26 terminate above the respective recess 43. In this way, molten fat 18 collected on the upper surfaces of the side flanges 32 of the bars 26 flows in a direction along the length of the bars 26 in two directions and is collected in the respective recess 43. If desired, each recess 43 may slope towards the rear of the tray. Furthermore a hole 44 could be provided in the bottom of each recess 43 so that melted fat runs out of the recess 43 through the hole

44. A container (not shown) may be positioned under the hole 44 to catch the molten fat 18.

In the embodiment shown in Figures 2 to 5 the side flanges 32 are slightly curved upwards. If desired the side flanges 32 of each bar 26 may be formed so that they project slightly upwards relative to the main body 28 and define a shallow "V" shaped trough running along the upper surface of the side flanges 32. This is shown in Figure 7. Alternatively the side flanges 32 may be relatively flat with a lip 46 running along the longitudinal extremity of the flanges. This is shown in Figure 8.

The members 26 of Figures 2 to 8 are preferably made as metal bars formed by extruding or pultruding them. However the members 26 could be made by folding thin metal sheets as shown in Figures 9 to 10 to define the main body 28 and side members 32.

In particular, in Figures 9 and 11, the main bodies 28 comprise a thin metal sheet folded with the side faces 30 projecting downwards to define equivalent structure to that of the flange 28. In Figure 9 the sheet is folded along two lines 48 to form side flanges 32 that project slightly upwards. In Figure 10 the sheet is folded about two lines 48 to form the side flanges 32 and then folded about two lines 49 to form angled lips 46 at the free ends of the side flanges 32.

It will be appreciated from the above that side flanges 32 may be symmetrical relative to the main body 28 or asymmetrical. Furthermore, if the flange 28 is inclined to the vertical, the side flanges 32 should extend in a horizontal direction sufficient to collect any fat runs down the side faces 30. However, in order not to impede the cooking of food placed on the bars 26 and to increase exposure of the food to as much direct

heating as possible, the side flanges 32 should not extend to such an extent that they project under adjacent bars 26 or block off direct heating from the heat source below the food. Ideally radiated heat from the heat source 10 should have a direct vertical path to the food on the bars.

Referring to Figure 11 there is shown an insert that can be retrofitted to racks of the type shown in Figure 1 to make full use of the present invention.

Referring to Figure 11 the insert is in the form of a thin metal sheet 45 folded along an axis so as to wrap around a circular cross-section bar 14. The sheet 45 is folded so that it has a main body 28 having two faces 30 that project downwards and fulfil the same purpose as the faces 30 of Figures 2 to 10. The sheet 45 is folded about two lines 49 to form side flanges 32 that extend slightly upwards. The side flanges 32 perform the same function as those of Figures 2 to 10. To secure the sheet 45 in place on the bars 16 small tangs 47 projecting upwards are pressed out of the side faces to engage the underside of the bars 16. In this way the sheet 45 can be pressed on to the bars 16. In so far as the present invention is concerned the combination of the known circular cross-section bars 16 (or any other cross-sectional shape for that matter) and the insert 45 shown in Figure 11 are the equivalent of the members 26 of Figures 1 to 10. In order that existing racks can be modified in this way it would be preferable to provide a receptacle at one or both ends of the insert to catch the melted fat.

A receptacle to collect the fat from the side members could be a separate item or could be clipped to the members 26 or the support rods 36 and/or inserts 45 of Figures 2 to 11.

It is to the understood that the members 26 and inserts 45 may be made of steel or cast iron. If desired they may be chromium plated or coated with polyletrafluroethylene (PTFE) or enamelled so as to provide a non-stick surface at least on surfaces 30 and the upper surfaces of the side members.

It will be appreciated that although the heating rack has been described for use in barbecues and the like, it may be used under grills or in ovens and microwave ovens where the heat source is not necessarily confined to beneath the rack.

From the foregoing it will be appreciated that by exploiting the surface tension effects and inducing the fat to wet and run down the surfaces 30 the spacing between the members 28 can be opened up and this helps to increase the amount of exposure of the food item to radiated and convective heat from below without fear of excessive dripping of fat on to the heat source. This has the advantage of improving the quality and flavour of the cooked food.

CLAIMS

1. A heating rack comprising a plurality of spaced discrete elongate members which an object to be heated is placed and exposed to a source of heat, each member having a main body with two side faces that, in use, extend in a vertical direction and along the member, and a side member located at the lowermost extremity of each side face, each side member being shaped, positioned, and arranged, relative to its respective side face so that, in use, liquid from the object when it is heated is induced to run down each side face due to surface tension effects and are collected by each side member and directed in a direction along each side member to a collection region at one or both ends of the members.

2. A heating rack according to claim 1, wherein the side members are inclined along their length so that liquid collected by the side members is directed along the side members to a collection region at one or both ends of the side members.

3. A heating rack according to claim 1 or claim 2, wherein the members are inclined along their length so that the liquid collected by the side members is directed in a direction along the side members to a collection region at one or both ends of the main members.

4. A heating rack according to claim 2, wherein the side members are inclined in two directions along their length.

5. A heating rack according to claim 3 wherein the main members are inclined in two directions along their length.

6. A heating rack according to claim 3, wherein the members are curved along their length being higher at a mid-span region than at their ends.

7. A heating rack according to any one of the preceding claims, wherein the members are formed from a sheet of metal that is folded to define the main body with two side faces and the side members.

8. A heating rack according to any one of the preceding claims, wherein the members are of substantially inverted "T" shape cross-section.

9. A heating rack according to any one of the preceding claims, wherein the members are mounted on support rods.

10. A heating rack according to claim 9, wherein the support rods define a frame with rods extending across the frame transverse to the members.

11. A heating rack according to any one of the preceding claims, wherein each member comprises a sheet of metal that is folded into a shape that fits over a supporting rod and defines the main body with the two side faces and the side members.

12. A heating rack according to any one of the preceding claims, wherein a receptacle is provided to collect fluids from the side members.

13. A heating rack according to claim 12, wherein the receptacle is suspended or attached to the members.

14. A barbecue heating device incorporating a rack constructed in accordance with any one of the preceding claims.

KL/JW/P03759GB
November 6, 2002

ABSTRACT

A heating rack comprising a plurality of spaced discrete elongate members (26) which an object (16) to be heated is placed and exposed to a source of heat. Each member (26) having a main body (28) with two side faces (30) that, in use, extend in a vertical direction and along the member (26), and a side member (32) located at the lowermost extremity of each side face (30). Each side member is shaped, positioned, and arranged, relative to its respective side face (30) so that, in use, liquid from the object (16) when it is heated is induced to run down each side face (30) due to surface tension effects and is collected by each side member (32) and directed in a direction along each side member (32) to a collection region at one or both ends of the members (26).

KL/JW/P03759GB
November 6, 2002